RADIOLYTIC DEGRADATION OF MOLECULAR BIOSIGNATURES

R. W. Carlson and M. S. Anderson
Jet Propulsion Laboratory, California Institute of Technology
Pasadena, CA 91109

Astrobiological missions to Europa are being studied by the Astrobiology Institute's Europa Focus Group, who recommended chromatographic and spectroscopic searches for biomarker molecules that may be present in the near subsurface. Europa's surface is bombarded by high-energy electrons and protons that rapidly decompose and chemically modify surface materials, so the stability and alteration of biomarker molecules is of interest. We have initiated radiation studies of representative biosignature molecules at Europan irradiation conditions and are employing gas chromatography and mass spectroscopy to determine the radiolysis products. Initial studies are being performed on pure picolinic acid and cholesterol and their aqueous solutions. A variety of molecular products are anticipated, formed from molecular dissociation, dimerization, polymerization, and addition and abstraction reactions. Results for a 10 Mrad dose will be presented.